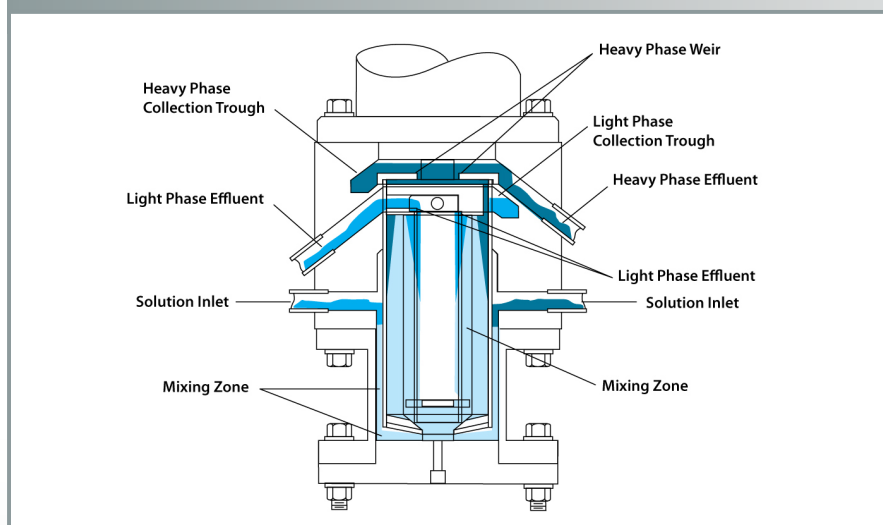


Manufacturing Biodiesel from Triglycerides

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Technology Summary

ORNL researchers have developed an apparatus that manufactures biodiesel by the reaction of triglycerides with an alcohol and subsequently separates the biodiesel product from the glycerol byproduct. The invention represents an advancement in centrifugal contactor technology in that the new device makes it possible to adjust and control the time in the residence time in the reactor section of the apparatus. The technology is applicable to biodiesel production or any other reaction in which miscible or immiscible reactants (liquid-liquid or gas-liquid) generate immiscible products, as well as to conventional liquid/liquid extractions.

ORNL has a long history in the development and use of centrifugal solvent extraction contactors for use in the selective recovery of dissolved metal elements. In these applications, a feed solution is dispersed with an immiscible solvent, allowing one or more chemical components to transfer between the two solutions. The dispersed liquids are then separated by centrifugation in the same device. By design, the extraction apparatus minimizes residence time, making it unsuitable for use with chemical reactions or solvent extraction operations in which the rate of reaction or solute transfer is slow.

Like the previously developed centrifugal contactor, the new apparatus has been configured to provide continuous mixing of reagents or liquid-liquid extraction solution pairs combined with continuous separation of immiscible effluents. However, the new device has also been configured to provide extended, controller residence times in its reactor/mixing region, thereby facilitating its use in rate-limited reaction/extraction processes.

Advantages

- Provides a continuous process for contacting liquids or reactants and for separating liquids or reaction products that are substantially immiscible from one another
- Provides sufficient contacting and/or reaction time to get higher yields of product.
- Adjusting the time for a particular reaction or fluid separation scheme is readily achievable
- Has higher throughput and requires less facility space than conventional residence-controlled mass transfer/reactor systems

Potential Applications

- Biodiesel production
- Oxidation of organic precursors into intermediate compounds
- Selective extraction of trivalent actinide and/or lanthanide elements

Patent

Joseph F. Birdwell, Jr., Constantinos Tsouris, Harold L. Jennings, and Joanna McFarlane. *Integrated Reactor and Centrifugal Separator and Uses Thereof*, U.S. Patent Application 12/128,157, filed May 28, 2008.

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Inventor Point of Contact

Joseph F. Birdwell, Jr.,
Nuclear Science and Technology Division
Oak Ridge National Laboratory

Licensing Contact

Doug Speight
Senior Technology Commercialization Manager,
Physical Sciences
UT-Battelle, LLC
Oak Ridge National Laboratory
Office Phone: 865.241.6564
E-mail: dspeight@ornl.gov

